

廈門大學



信息学院软件工程系

《计算机网络》实验报告

题 目 实验五 CISCO IOS 路由器基本配置

班 级 软件工程 2018 级 3 班

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2020 年 4 月 8 日

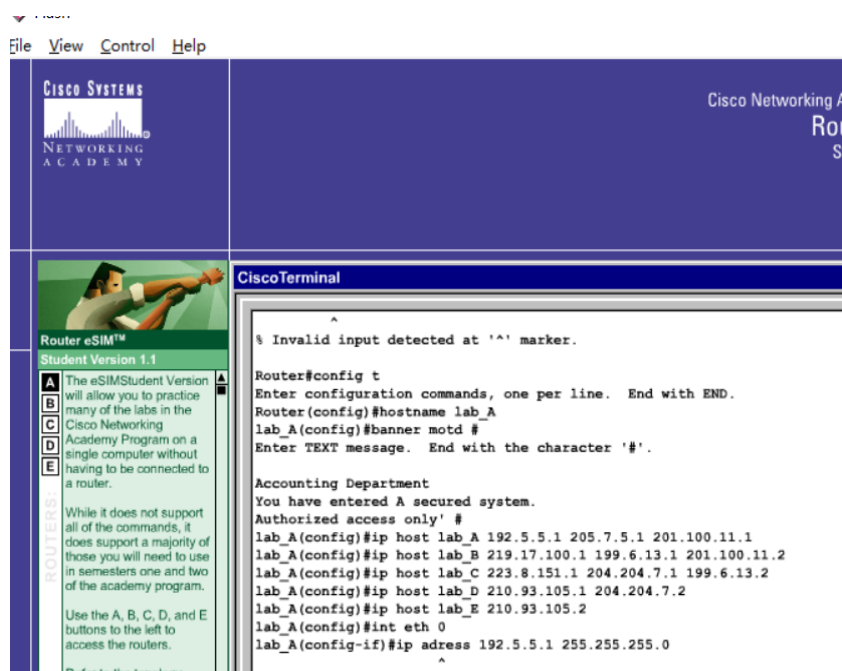
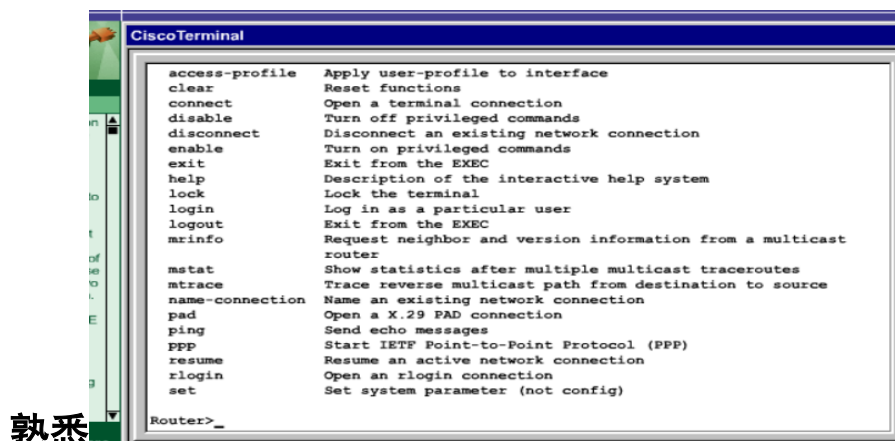
1 实验目的

- 2 使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）

3 实验环境

WIN10, Router eSIM v1.1 模拟器、CCNA Network Visualizer 6.0 、Cisco Packet Tracer 等。

4 实验结果

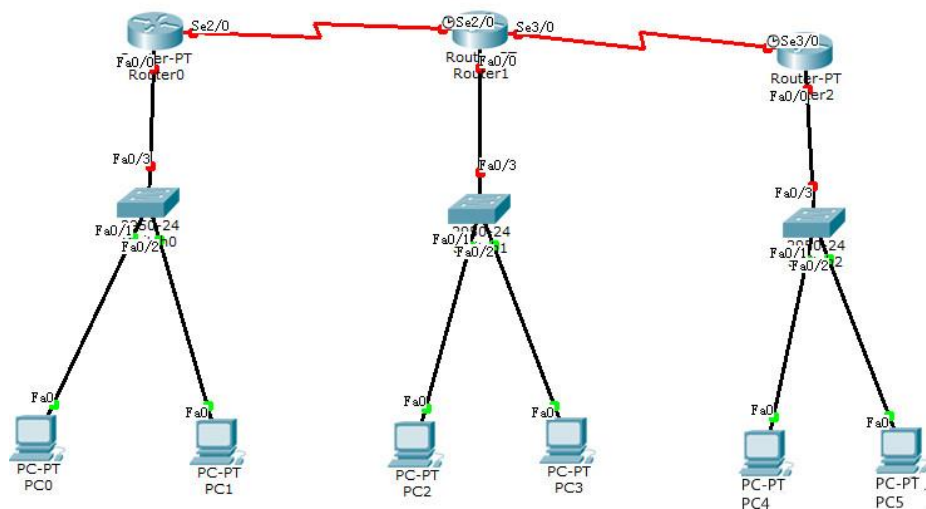


由于中间出了点问题

询问同学后改用 Cisco Packet Tracer 做实验了

静态路由配置

步骤一：构建网络环境



步骤二：基本配置

(1) 配置计算机 IP、网关及子网掩码 (PC0 为例)

PC0: 192.168.5.8 255.255.255.0 192.168.5.1

PC1: 192.168.5.88 255.255.255.0 192.168.5.1

PC2: 192.168.4.8 255.255.255.0 192.168.4.1

PC3: 192.168.4.88 255.255.255.0 192.168.4.1

PC4: 192.168.3.8 255.255.255.0 192.168.3.1

PC5: 192.168.3.88 255.255.255.0 192.168.3.1

PC0

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address	192.168.5.8
Subnet Mask	255.255.255.0
Default Gateway	192.168.5.1
DNS Server	

2) 为交换机的 VLAN 配置 IP 地址及网关 (switch0 为例)

Switch0 192.168.5.1 255.255.255.0

Switch1 192.168.4.1 255.255.255.0

Switch2 192.168.3.1 255.255.255.0

```
Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#exit
Switch(config)#interface vlan1
Switch(config-if)#ip address 192.168.5.1 255.255.255.0
Switch(config-if)#
```

Ctrl+F6 to exit CLI focus

Copy Paste

(3) 为路由器端口配置 IP 地址及网关, 并打开端口, 设置 serial 端口的 color rate

参数为: 64000(Router2 为例)

Router1:

端口 IP 地址 网关

F0/0 192.168.5.1 255.255.255.0

Serial2/0 192.168.1.1 255.255.255.0

Router2:

端口 IP 地址 网关

F0/0 192.168.4.1 255.255.255.0

Serial2/0 192.168.1.2 255.255.255.0

Serial3/0 192.168.2.1 255.255.255.0

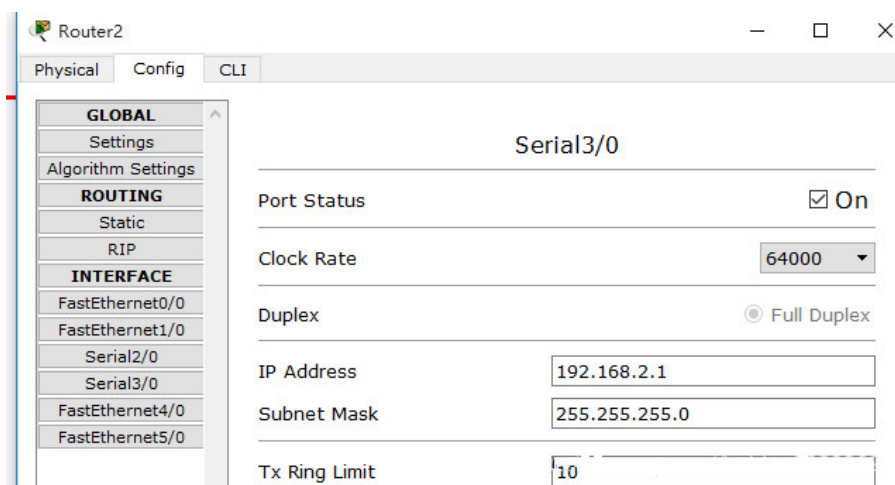
Router3:

端口 IP 地址 网关

F0/0 192.168.3.1 255.255.255.0

Serial3/0 192.168.2.2 255.255.255.0

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.4.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#interface Serial2/0
Router(config-if)#clock rate 64000
Router(config-if)#ip address 192.168.1.2 255.255.255.0
Router(config-if)#no shutdown
```



步骤三：配置路由器下一跳地址,命令:ip route 目标 IP 地址 网关 下一跳 IP 地址
(Router1 为例)

路由表 r0

目的网络 下一跳

192.168.5.0 fa0/0

192.168.1.0 serial2/0

192.168.3.0 192.168.1.2

192.168.4.0 192.168.1.2

路由表 r1

目的网络 下一跳

192.168.4.0 fa0/0

192.168.1.0 serial2/0

192.168.2.0 serial3/0

192.168.3.0 192.168.2.2

192.168.5.0 192.168.1.1

路由表 r2

目的网络 下一跳

192.168.3.0 fa0/0

192.168.2.0 serial3/0

192.168.4.0 192.168.2.1

192.168.5.0 192.168.2.1

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.4.0 255.255.255.0 192.168.1.2
Router(config)#ip route 192.168.3.0 255.255.255.0 192.168.1.2
Router(config)#

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Serial2/0
S    192.168.3.0/24 [1/0] via 192.168.1.2
S    192.168.4.0/24 [1/0] via 192.168.1.2
C    192.168.5.0/24 is directly connected, FastEthernet0/0

Router#
```

步骤四：在一个网段 ping 另一个网段的计算机

```
C:\>ping 192.168.4.8

Pinging 192.168.4.8 with 32 bytes of data:

Reply from 192.168.4.8: bytes=32 time=10ms TTL=126
Reply from 192.168.4.8: bytes=32 time=18ms TTL=126
Reply from 192.168.4.8: bytes=32 time=1ms TTL=126
Reply from 192.168.4.8: bytes=32 time=1ms TTL=126

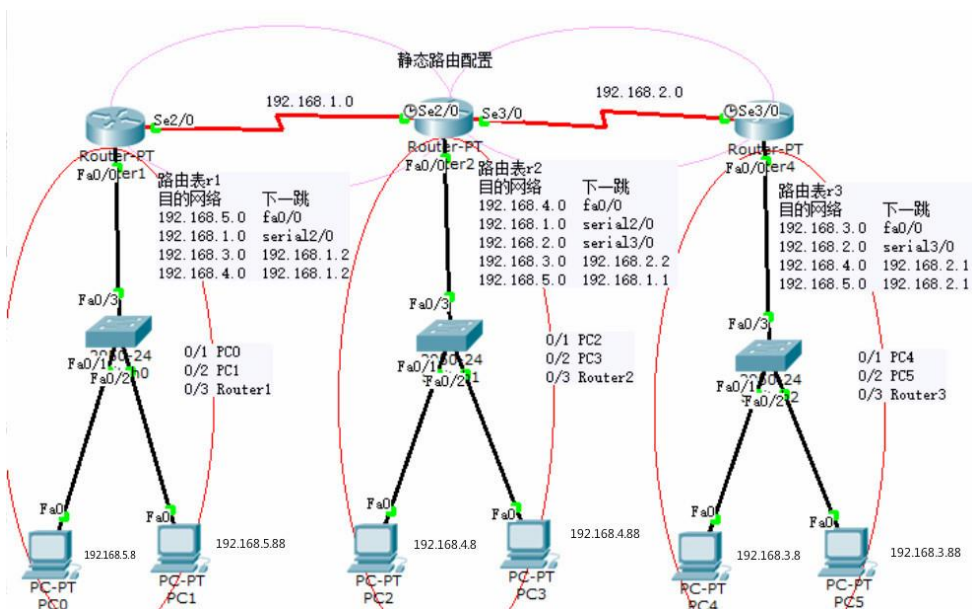
Ping statistics for 192.168.4.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 18ms, Average = 7ms

C:\>ping 192.168.3.8

Pinging 192.168.3.8 with 32 bytes of data:

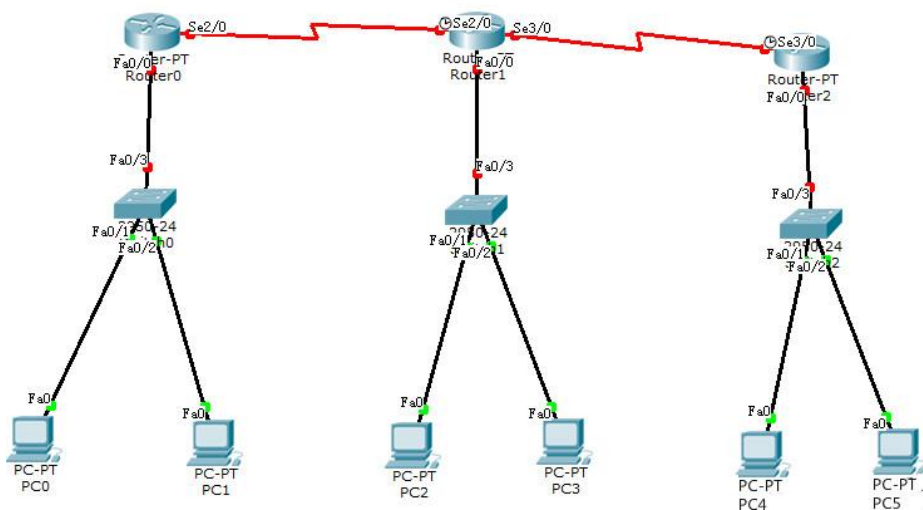
Reply from 192.168.3.8: bytes=32 time=11ms TTL=125
Reply from 192.168.3.8: bytes=32 time=2ms TTL=125
Reply from 192.168.3.8: bytes=32 time=3ms TTL=125
Reply from 192.168.3.8: bytes=32 time=2ms TTL=125
```

5.总结构图



动态路由配置

1、步骤一：构建网络环境



2、步骤二：基本配置

(1) 配置计算机 IP、网关及子网掩码 (PC0 为例)

PC0: 10.1.1.8 255.255.255.0 10.1.1.1

PC1: 10.1.1.88 255.255.255.0 10.1.1.1

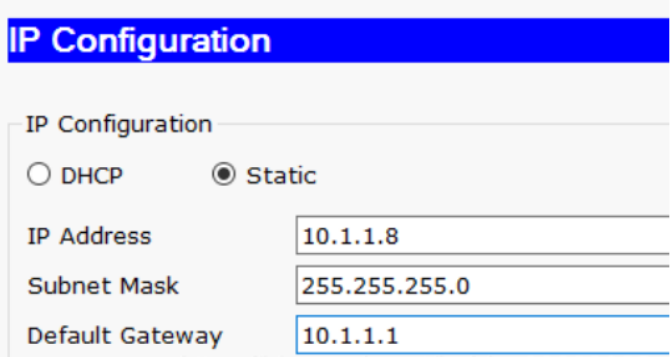
PC2: 10.2.1.8 255.255.255.0 10.2.1.1

PC3: 10.2.1.88 255.255.255.0 10.2.1.1

PC4: 10.3.1.8 255.255.255.0 10.3.1.1

PC5: 10.3.1.88 255.255.255.0 10.3.1.1

 PC0



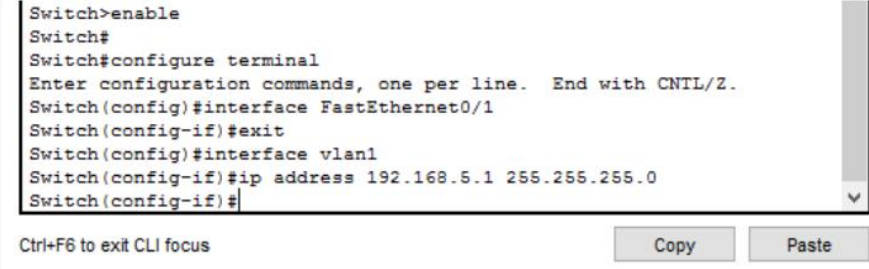
The image shows a screenshot of the 'IP Configuration' window for PC0. The window has a blue title bar with the text 'IP Configuration'. Below the title bar, there is a section titled 'IP Configuration' with two radio buttons: 'DHCP' and 'Static'. The 'Static' radio button is selected. Below the radio buttons, there are three input fields: 'IP Address' with the value '10.1.1.8', 'Subnet Mask' with the value '255.255.255.0', and 'Default Gateway' with the value '10.1.1.1'.

2) 为交换机的 VLAN 配置 IP 地址及网关 (switch0 为例)

Switch 0 10.1.1.1 255.255.255.0

Switch 0 10.2.1.1 255.255.255.0

Switch 0 10.3.1.1 255.255.255.0



```
Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#exit
Switch(config)#interface vlan1
Switch(config-if)#ip address 192.168.5.1 255.255.255.0
Switch(config-if)#
```

Below the terminal window, there is a status bar that says 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'.

(3) 为路由器端口配置 IP 地址及网关，并打开端口，设置 serial 端口的 color rate 参数为：64000(Router0 为例)

Router0:

端口 IP 地址 网关

F0/0 10.1.1.1 255.255.255.0

Serial2/0 192.168.0.1 255.255.255.0

Router1:

端口 IP 地址 网关

F0/0 10.2.1.1 255.255.255.0

Serial2/0 192.168.0.2 255.255.255.0

Serial3/0 192.168.1.1 255.255.255.0

Router2:

端口 IP 地址 网关

F0/0 10.3.1.1 255.255.255.0

Serial3/0 192.168.1.2 255.255.255.0

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 10.1.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#interface serial2/0
Router(config-if)#clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
```

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
```

3、步骤三：配置路由器 RIP，设置版本号为 2(Router0 为例)

Router0: RIP 配置

version 2

network1 10.1.1.0

network2 192.168.0.0

Router1: RIP 配置

version 2

network1 10.0.0.0

network2 192.168.0.0

network3 192.168.1.0

Router2: RIP 配置

version 2

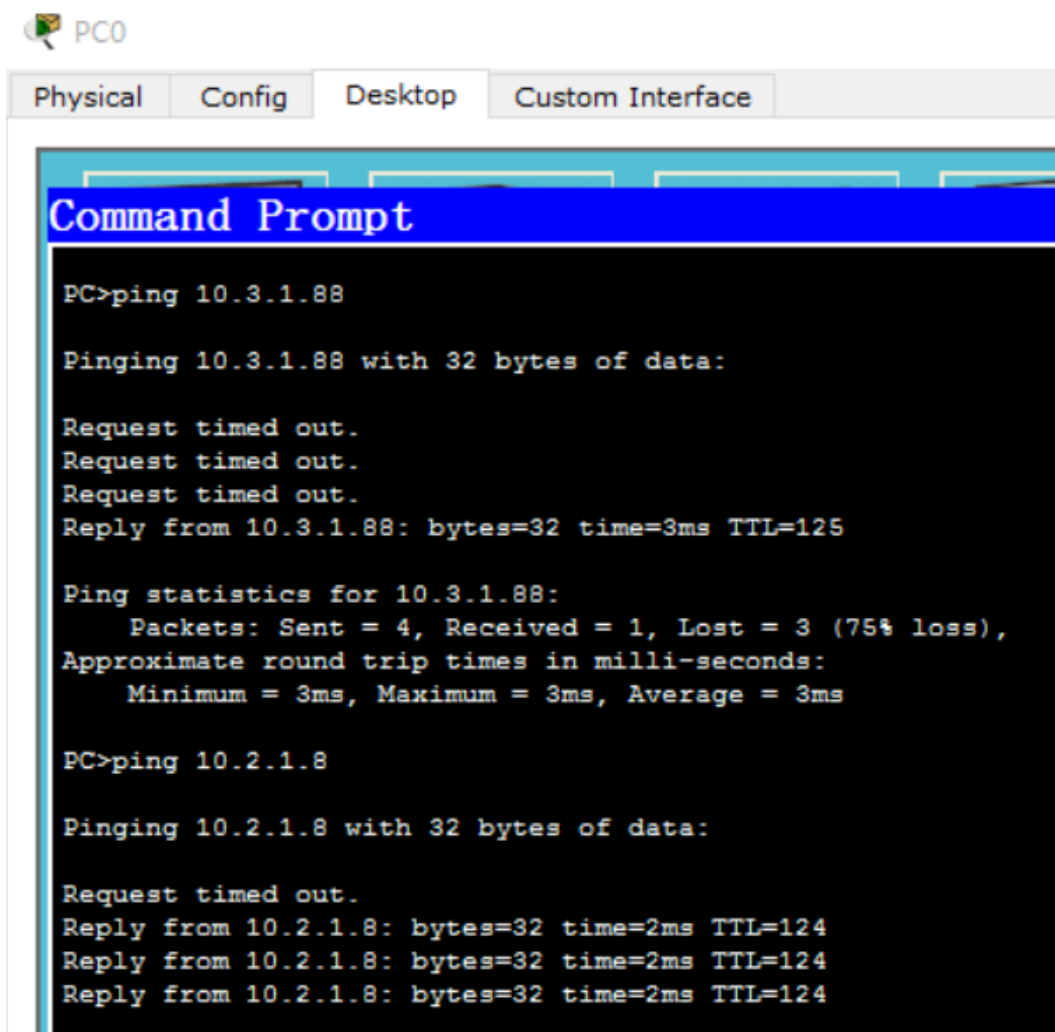
network1 10.1.1.0

network2 192.168.1.0

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#network 10.1.1.0
Router(config-router)#network 192.168.0.0
Router(config-router)#
```

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
```

步骤四：在一个网段 ping 另一个网段的计算机（PC0 分别与 PC2 和 PC5 进行 ping 测试）



The screenshot shows the desktop of PC0 in a network simulation environment. The desktop has four tabs: Physical, Config, Desktop, and Custom Interface. The Desktop tab is active, displaying a 'Command Prompt' window. The window has a blue title bar and a black background with white text. The text shows two ping commands being executed. The first command is 'ping 10.3.1.88', which results in three 'Request timed out.' messages followed by a successful reply from 10.3.1.88 with 32 bytes, 3ms time, and TTL=125. The second command is 'ping 10.2.1.8', which results in one 'Request timed out.' message followed by three successful replies from 10.2.1.8 with 32 bytes, 2ms time, and TTL=124.

```
PC>ping 10.3.1.88

Pinging 10.3.1.88 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Reply from 10.3.1.88: bytes=32 time=3ms TTL=125

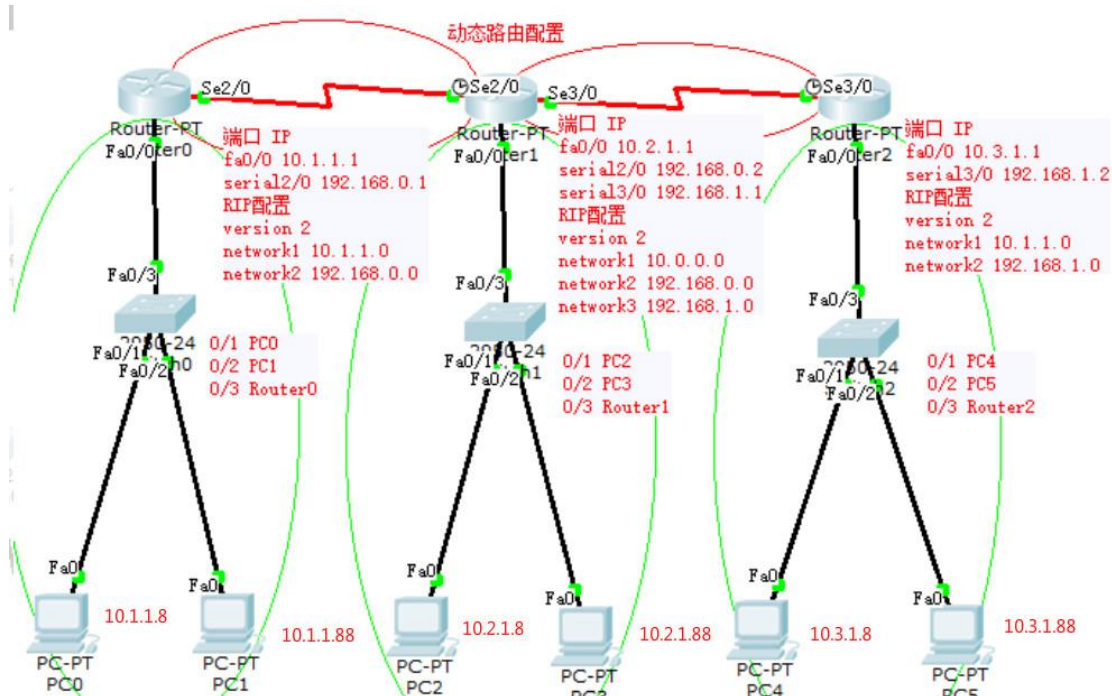
Ping statistics for 10.3.1.88:
    Packets: Sent = 4, Received = 1, Lost = 3 (75% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 3ms, Average = 3ms

PC>ping 10.2.1.8

Pinging 10.2.1.8 with 32 bytes of data:

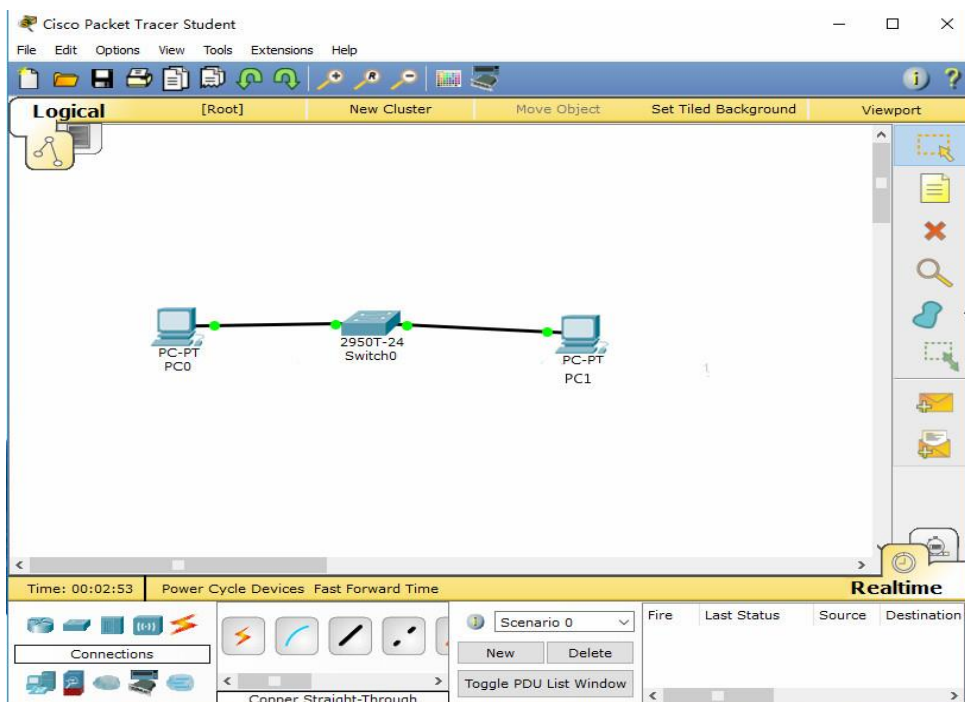
Request timed out.
Reply from 10.2.1.8: bytes=32 time=2ms TTL=124
Reply from 10.2.1.8: bytes=32 time=2ms TTL=124
Reply from 10.2.1.8: bytes=32 time=2ms TTL=124
```

5.总结构图



配置交换机端口的 VLAN

首先将两台 PC 通过 Copper Straight-Through 电缆与 2950 交换机相连



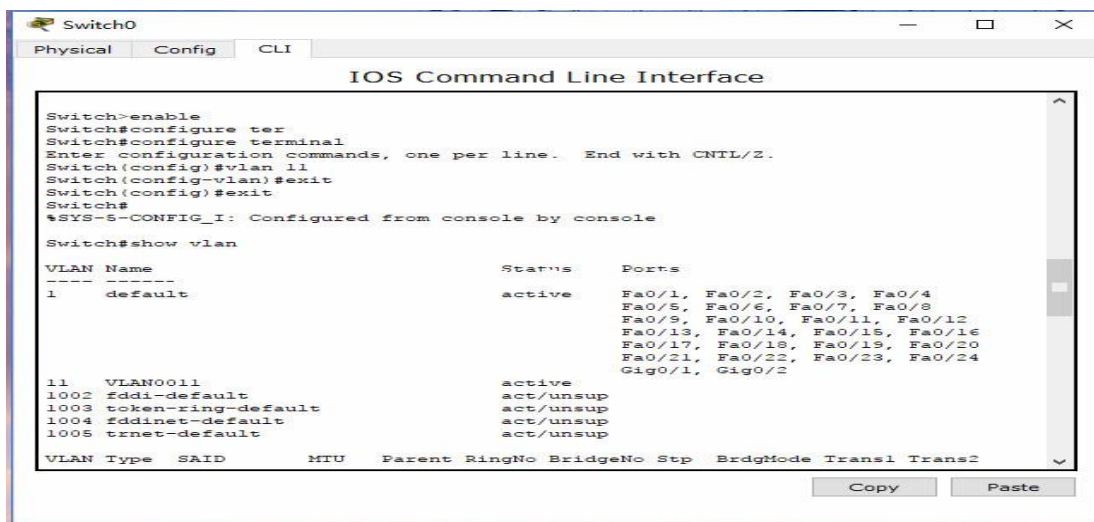
接着进入交换机的命令行界面 CLI 输入 `enable` 进入全局模式，再输入 `configure terminal` 进入全局配置模式。通过 `vlan 11` 语句创建标号为 11 的 VLAN，并进入到该 VLAN。

此时可以 `exit` 退回到全局模式，通过 `show vlan` 语句来查看刚刚创建的 VLAN。

首先通过 `interface vlan 11` 语句进入 VLAN 11 的接口配置模式，

再利用 `ip address IP 地址 子网掩码` 语句来设置 IP 地址与子网掩码，

接着使用 `no shutdown` 语句激活设置。这里设置的 IP 地址为 192.168.1.1，子网掩码为 255.255.255.0。

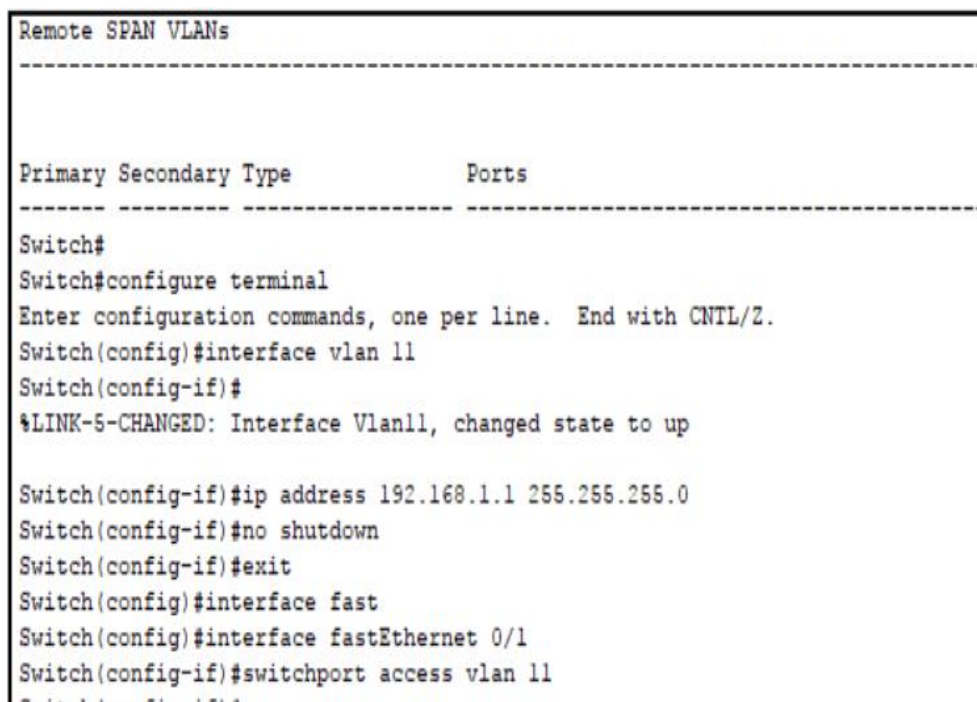


接下来我们可以将 PC 接入已经设置好的 VLAN。

进入全局配置模式之后，通过 `interface fastethernet 0/编号` 命令进入连接 PC 的端口，这里用的是 `fastethernet 0/1`。

再输入 `switchport access vlan 11` 命令将 0/1 端口划分到 VLAN 11 中。

用同样的方法将 0/2 端口划分到 VLAN 11 中后，可以在特权模式下通过 `show vlan` 命令查看 VLAN。

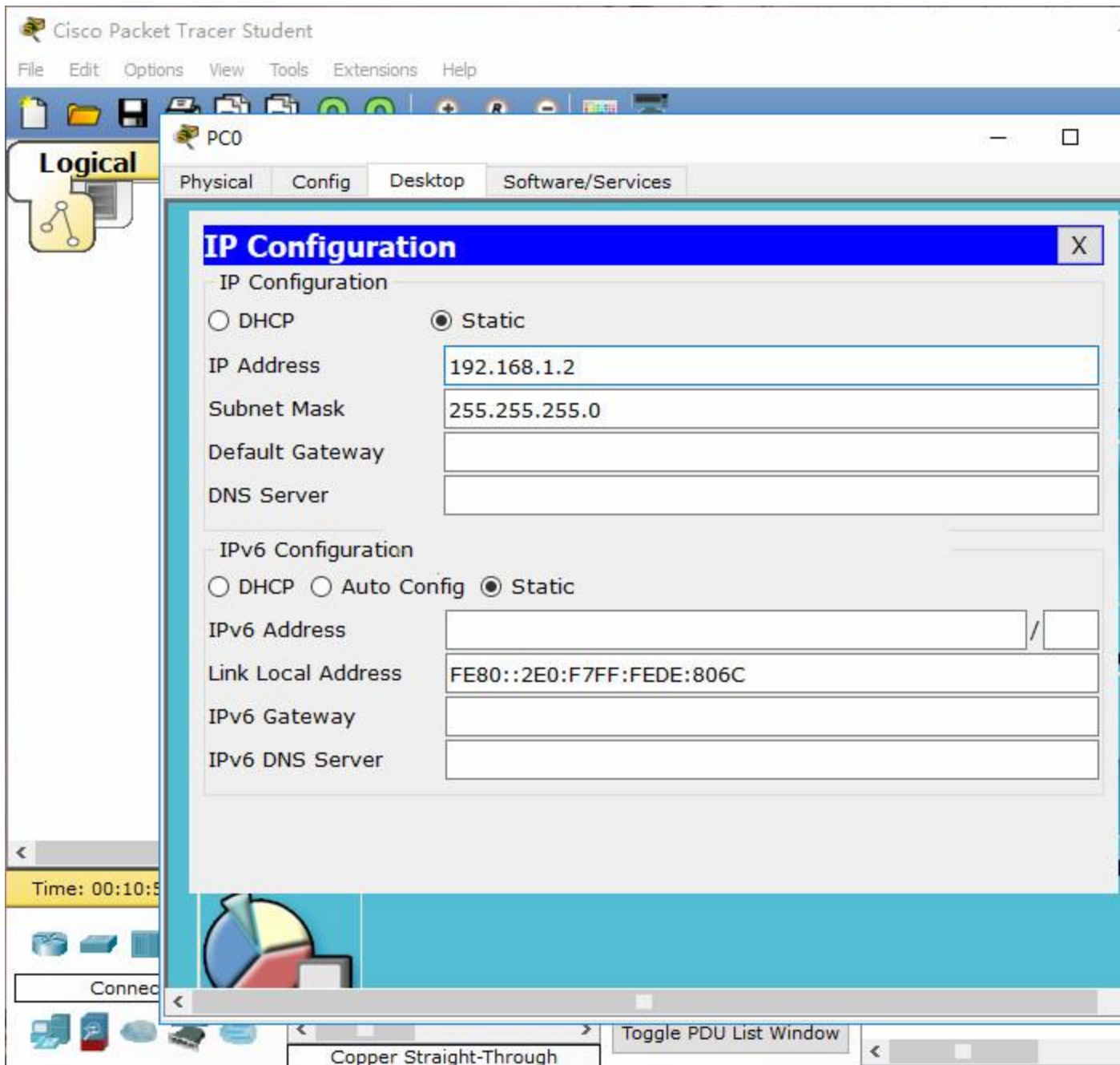



```
Switch(config-if)#exit
Switch(config)#interface fastethernet 0/2
Switch(config-if)#switchport access vlan 11
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

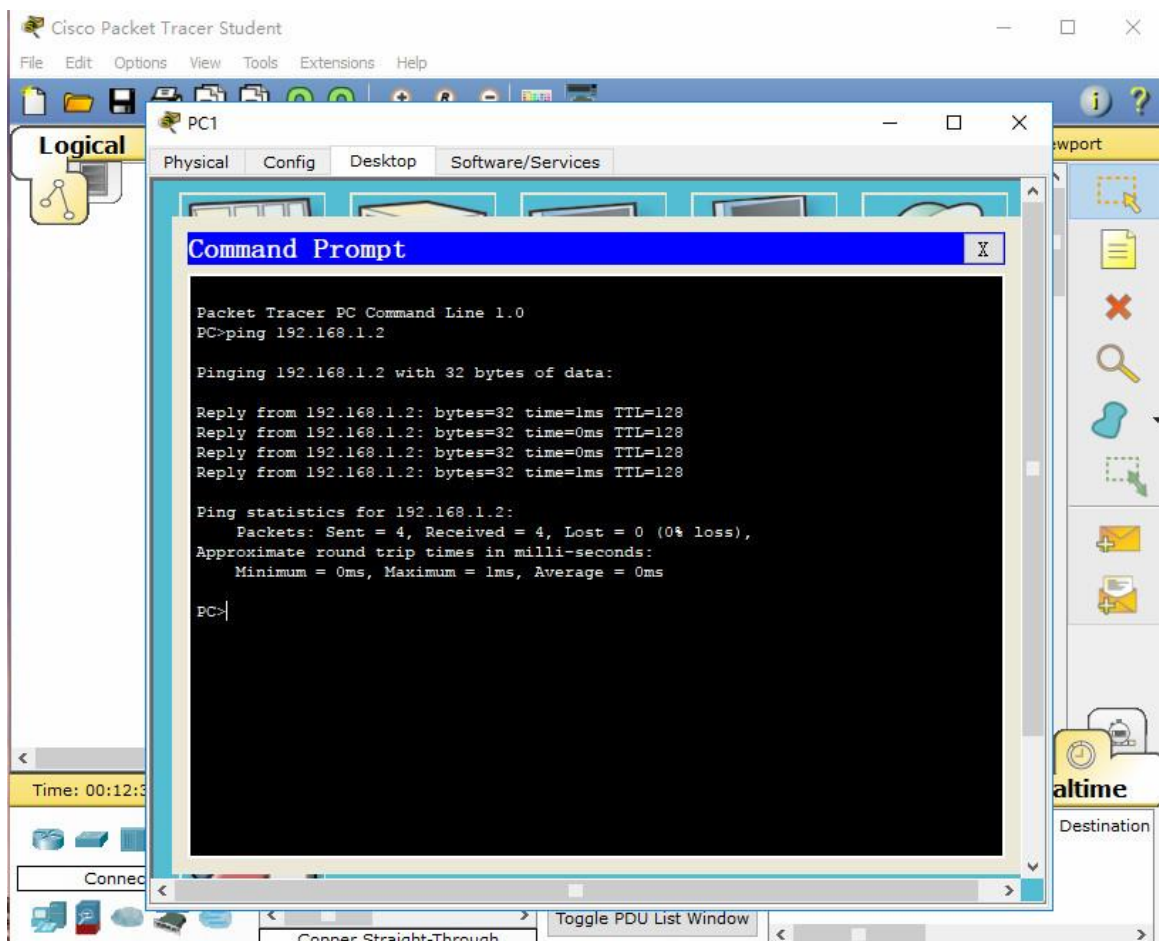
```
Switch#show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/3, Fa0/4, Fa0/5, Fa0/6 Fa0/7, Fa0/8, Fa0/9, Fa0/10 Fa0/11, Fa0/12, Fa0/13, Fa0/14 Fa0/15, Fa0/16, Fa0/17, Fa0/18 Fa0/19, Fa0/20, Fa0/21, Fa0/22 Fa0/23, Fa0/24, Gig0/1, Gig0/2
11 VLAN0011	active	Fa0/1, Fa0/2
1002 fddi-default	act/unsup	

这时我们应该对两台 PC 进行 IP 分配。这里我将 PC0IP 地址设置为 192.168.1.2，PC1IP 地址设置为 192.168.1.3。



我们可以在 PC 中互 ping，PC0 和 PC1 在一个 VLAN 当中，是可以 ping 成功的。



5 实验总结

改用 Cisco Packet Tracer 做实验了